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# • EDITORIAL •

## Labor in Wartime

The morning paper had a big headline. No, it wasn't another advance for the 8th Army in Tunisia or another advance by the Russians, but it read: "15,000 Ford War Workers Idle." Now we do not intend to attempt to lay the blame for such an occurrence on either the workers or the management in this instance, but we do feel that here is another instance of the results of a lack of real labor policy by the Dominion Government.

It isn't the only instance either, in fact, we are rather inclined to the belief that most of the stoppages in industry right now are due more or less to this fact, at least they can be traced to this fact.

The government seems inclined to give labor a better deal, and with this few people will quarrel, but in doing so the government seems to lean over backwards in the sense that while industry has to toe the line there seems little evidence that labor is being made to feel a sense of responsibility.

In other words, labor probably feels, as a result of the rather weak labor policy of the government, that now is the time to "get away with almost anything". These stoppages are not always the result of refused wage increases by any means and the reasons for some of them are ridiculous in the extreme.

The government said, wages are frozen as from now on and price ceilings are fixed from now on. That should have been the end of both matters, but it wasn't.

Wages have been increased from time to time and inevitably costs have increased.

We have stated before that in our belief the government should have equalized wages before freezing them, but they didn't, and so they were forced by the attitude of labor to concede wage increases. The steel strike was one example.

There may have been ample reasons for this concession to labor in some instances, but again, wages had been frozen in an attempt to keep down the rising cost of living and also, let it be said, the rising cost of armaments and war supplies.

In some instances the representations of industry have been ruthlessly brushed aside with further concessions to labor and it seems to us that labor, having tasted blood, wants more blood.

The C.I.O., with its policy of organizing whole industries regardless of trades, seems to be trying not alone to obtain control of such industries but, eventually of governments, and will do so unless those in power make labor unions toe the line.

## ACROSS THE SECRETARY'S DESK

What is wanted is definite fixed labor policy by the government with both industry and labor being made to realize that they must both toe the line. There has been far too much pampering of war workers and there has been far too much vacillating with the "racketeers" in organized labor.

Let labor understand that its rights will be respected, but do not let us have any more of this weak, shilly shallying by which labor has been appeased with the same result as that obtained when the United Nations tried to appease Germany.

No good can come of such a policy and lots of harm will come of it if it is persisted in.

More and more it looks as though governments were more concerned with votes at the next election than in laying down a firm, sane labor policy.

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## Across the Secretary's Desk

Since the last issue of "Cost and Management" it has been rather a hectic time in the Secretary's office.

For instance, there has been the visit of our Dominion President, Percy W. Wright, of Montreal. He arrived in Toronto on Sunday morning, April 18, and in the afternoon there was a session with he, Paul Kellogg, Harold Wright and myself, who were appointed a committee on by-laws some time ago, and we were busily engaged on re-vamping the by-laws the whole of that afternoon in Toronto.

We really took off our coats and went to work, with the result that we finished the job before Harold and I left for home. Unfortunately, Reg. Louthood could not come up from Montreal for this meeting, and more unfortunately, "Hal" Hetherington, the other member, was confined to his home in Toronto through illness. "Hal" is coming along nicely, something his many friends will be indeed glad to hear.

On the following day, Percy Wright and I had a date to meet the Toronto directors at luncheon, a really splendid gathering, in the Arcadian Court at Simpson's in Toronto.

We both thoroughly enjoyed this delightful get-together, presided over by Harry Metcalfe, chairman of the Toronto Chapter, but we had to rush away to catch a plane for Ottawa and that is when the fun commenced.

We drove to Malton Airport in a terrific rainstorm and there was some doubt as to whether or not the plane would take off for Ottawa. It did, and we arrived in Ottawa on time to find Chairman Ran. Hartin and the speaker, Professor J. L. McDougall, of Queen's University, awaiting us at the Uplands Airport and no rain. We attended the regular meeting of the Ottawa Chapter and a grand meeting it was, but both Percy and I were somewhat worried because again there was some considerable doubt concerning whether or not the night flight to Toronto would take off. After some considerable telephoning, Vern Campbell very kindly drove us to the Airport, where we found the plane late, but apparently everything was in order and we were assured that the plane would take off for Toronto even though it was late. It did, but as Percy and I were regaling ourselves with a cup

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of coffee supplied by a very charming Airline hostess, we were informed that the plane could not land in Toronto because of very bad weather conditions, and that we would land at North Bay and probably spend the night there. Percy and I had to go to Kitchener the following day, and to make matters worse, I had arranged to meet my wife in the lobby of the Royal York Hotel in Toronto at about 12.30 that night. We finally landed in North Bay something after 1 a.m., but after a delay found that we were to try to land at Malton. I had the T.C.A. contact my wife and arrange for a room at the Royal York, and we arrived in Malton at about 3 a.m. in a blinding snowstorm and immediately drove to Toronto in some of the worst weather in my experience. After picking up my wife, I drove home, arriving there at 5.10 a.m. It wasn't much use going to bed then, so after breakfast I proceeded to the office.

Percy thoroughly enjoyed his inaugural airplane trip, but it was something he won't soon forget.

Luckily (for us) the Kitchener meeting was called off, and Percy came up to Hamilton the following day where we had a long session on Society affairs, a luncheon with Harold Wright, Ken Horton and Aleck Howey, then a visit to the plant of the Aerovox Co. of Canada through the courtesy of Walter Furneaux, and another plant visit for Percy to the Mercury Mills through the courtesy of Aleck Howey. I had to go back to the office and later we attended a really fine meeting of the Hamilton Chapter, after which Percy caught the night train for Montreal. Yes, it was somewhat hectic, but I thoroughly enjoyed Percy's visit.

He is one of the most popular Presidents we have ever had. Quiet and unassuming, but with a thorough grasp of Society affairs and a most delightful travelling companion, and when we arrived in North Bay in the early hours of the morning after failing to land at Malton, Percy's comment was: "You couldn't buy this experience," to which I replied, "Who would want to?"

During Percy's visit and after conferences with various Dominion directors, we finally arranged for the annual meeting of the Society to be held in Windsor on Friday and Saturday, June 18 and 19, so get ready, boys.

During the past two weeks I have had visits from two of our members in the armed forces. The two visitors were Jack Farnsworth, former Secretary of the Kitchener Chapter, now L.A.C. Farnsworth of the R.C.A.F., and the other was Leading Writer H. G. ("Herb") Wodehouse of the R.C.N.V.R. "Herb" is a student member of the Hamilton Chapter and attended several student meetings of the chapter while home on leave.

It was good to see these two boys and better still to realize that they took the trouble to look me up when they had a chance.

These are things that make my job so enjoyable, so don't forget you boys in the services, any time you can, look me up. I am always glad to see you.

R. D.

## NEW MEMBERS

### Literature Received

- Analysis and Interpretation of Financial and Operating Statements.  
Aust. Acct., January.
- Depreciation Under the Annuity System.  
Aust. Acct., January.
- Costing Systems for Defence Work.  
Aust. Acct., January.
- The Effect of Bookkeeping Machines on Audit Procedure.  
C.A. in Aust., February.
- Planning and Installing Accountancy Systems.  
C.A. in Aust., February.
- Wage and Salary Stabilization.  
N.A.C.A., March 15.
- Practice in Accounting for Continuing Expenditures Arising from  
Wartime Production.  
N.A.C.A., April 1.
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### New Members

- Montreal Chapter.  
A. P. Mills, Unemployment Insurance Commission, Montreal, Que.
- London Chapter.  
R. L. Sellars, Central Aircraft Ltd., Crumlin, Ont.  
F. A. Douglas, Central Aircraft Ltd., London, Ont.
- Windsor Chapter.  
W. T. Barrett, Chrysler Corp. of Canada Ltd., Windsor, Ont.  
Frank S. Bear, Stokeley-Van Camp of Canada Ltd., Essex, Ont.  
Roy F. Ryan, Dominion Forge & Stamping Co. Ltd., Windsor, Ont.
- Non-Resident.  
G. W. Langhorne, A. Wander Ltd., Peterboro, Ont.
- Hamilton Chapter.  
Gordon W. Fancey, Wright-Pounder & Co., Hamilton.  
A. R. Thompson, Coffield Washer Co. Ltd., Hamilton.  
L. W. J. Robertson, Canadian Westinghouse Co., Ltd., Hamilton.
- Edmonton Chapter.  
W. A. Frazer, National Home Furnishers Ltd., Edmonton.
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### Chapter Notes

#### Montreal Chapter.

The April meeting of the Montreal Chapter of the Cost and Management Institute was a pronounced success, and one of the best meetings of the season resulted. The speaker was Mr. F. R. Manuel, of Stevenson & Kellogg Ltd., Montreal, who gave a most instructing address on "Incentives

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to Worker, Salesman and Executive". Mr. Manuel's talk will be published in "Cost and Management" shortly and should be a decided addition to articles on this subject. For the closing meeting of the season, to be held on May 7th, the speaker will be A. V. "Vic" Madge, popular chairman of the Chapter, who has chosen as his subject, "Management—Vocation or Profession."

### **Toronto Chapter.**

The Toronto Chapter, as usual, will close its season with a Dinner Dance at the Old Mill on April 29th, when the members will relax and make merry. From present indications it should be a banner affair and the members generally are looking forward to a grand evening.

### **Hamilton Chapter.**

The closing meeting of the Hamilton Chapter, held at the Royal Connaught Hotel, was one of the most successful of the season. The speaker was Harold P. Wright, whose subject was, "The Registered Industrial Accountant, His Responsibilities and Opportunities." There was a good attendance and it was a most enjoyable evening. Mr. P. W. Wright, Dominion President, was present and spoke briefly to the gathering. He was very well received, as was our Ontario President, Harold Wright. The meeting was enlivened with references to the "Wright Brothers" and everyone present voted it a grand meeting. Jack Farnsworth, former Secretary of the Kitchener Chapter, and now in the R.C.A.F., was a visitor.

### **Niagara Chapter.**

The April meeting of the Niagara Chapter, while rather sparsely attended, was a most enjoyable affair. The speaker was the Secretary-Manager of the Society, who addressed the members on the subject, "Post War Planning". There was a prolonged discussion at the close and as is usual with small gatherings, it was a most instructive evening.

### **Kitchener Chapter.**

Unfortunately, owing to the fact that the speaker had to cry off at the last moment, the April meeting of the chapter had to be postponed. It is hoped to conduct this meeting within the next week or so, when Mr. A. G. Howey of Hamilton will address the members on "Budgetary Control".

### **London Chapter.**

The April meeting of the London Chapter was a pronounced success and easily the best attended meeting of the season. The speaker was Dr. M. K. Inman, Head of the Dept. of Economic and Political Science at the University of Western Ontario, and he addressed a very good turnout of members on the subject, "Review of the Beveridge Report" and "The Role of the International Bank in Post-War Reconstruction". Those who did not attend missed a very fine meeting.

### **Windsor Chapter.**

The April meeting of the Windsor Chapter was another very fine meeting, addressed by Mr. J. E. Carruthers, of the Ford Motor Co. of Canada. Mr. Carruthers gave an exceptionally fine talk on "Foundry Costing" and as his talk is being published in this issue of "Cost and Management" it needs no review here. It was, however, a most instructive talk and was greatly enjoyed by the well attended meeting.

## COSTING OF CANADIAN GOVERNMENT WAR CONTRACTS

The closing meeting of the chapter will be held on April 29th, and will be a Joint Meeting with the Detroit Chapter of the N.A.C.A. Mr. J. Kent Dever of the Hudson Motor Company of Detroit will address the meeting on "Burden Distribution".

### Costing of Canadian Government War Production Contracts

BY R. W. ADAMS, C.A.

Before the Ottawa Chapter of the Society of Industrial and Cost Accountants  
of Ontario, Monday, February 15th, 1943

Mr. Chairman and Gentlemen:

When my boss, Mr. Frank Wood, the Chief Cost Accountant, whom you all know as one of your valued members and former chairman, asked me to speak to your group to-night on the subject of "Costing of Canadian Government War Production Contracts," I was at first rather alarmed at the prospect of appearing before such a body of experts, particularly here in Ottawa. I had previously been warned of the dangers of making a speech right under "the horse's mouth." I would much prefer that this meeting had been in Halifax or Vancouver to-night, but when Mr. Wood assured me that it was just an informal and fraternal gathering and that even the "question and answer" period would be under the Marquis of Queensbury rules, the invitation then really appealed to me. Actually, I am indeed grateful for the opportunity to bring you a few thoughts which I hope will give you a clearer understanding of the great mysteries of costing war contracts.

The subject, as you can well appreciate, is that about which volumes could be written, and has several approaches. Two of these occurred to me. That is—from the audit viewpoint or the accounting viewpoint. Each is a large subject in itself, and in making a choice I felt that the accounting viewpoint, dealing as it does with the actual make-up and treatment of the various elements of the cost, would be the more interesting. I will not forget the audit features entirely, because you may like to know something of our work and organization, but I do not propose to go into the burdensome details of cost audit procedures, which cannot vary a great deal from the general principles of auditing in the commercial field, except that we might be somewhat more specific in our approach.

The Treasury Cost Accounting Division is a division of the Comptroller of the Treasury's Branch of the Department of Finance. This may be surprising to some of you, as to the outsider we are often referred to as a division of the Department of Munitions and Supply. The Department of Munitions is our biggest customer, but only on a service basis.

Early in the war, it was realized that some centralization of the work of cost investigation was necessary in order to eliminate the over-lapping of audits. If the Department of Munitions and Supply and its predecessor, the War Supply Board, had continued to carry out their own cost investigations, as they set out to do originally, further verification audits would, of

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necessity, have had to be undertaken by both the Comptroller of the Treasury and the Auditor-General. As a result, a single cost audit organization, under the Comptroller of the Treasury, was set up to service Canadian, United Kingdom and other allied contracts for any and all Canadian Government departments. The Auditor-General, of course, still retains the right to re-examine the costs of any contract in accordance with his usual powers.

From a modest beginning with the Chief Cost Accountant and, at the most, half a dozen assistants, the Division has now grown to a staff of half a dozen short of 400, with headquarters in Ottawa and branch offices in major cities and centres of war production from coast to coast. Apart from senior officials and the headquarters staff, approximately one half of our officers are what we know as resident cost accountants, that is, performing a continuous audit at both Government-owned and pre-financed projects and cost-plus construction jobs, with the other half carrying out field audits of specific cost plus, ceiling and target contracts.

So much for our organization, other than to say, our only wish is that it was twice as large. We are making every effort to secure the services of additional qualified men and have a standing order with the Civil Service Commission for over 200. When you think that the Canadian Government has placed over 5 billion dollars' worth of war contracts, a good percentage of which call for some form of a cost audit, it gives you some idea of the magnitude of the job we are required to do. Actually, before us now, we have something over 5,000 specific audits of a varied nature under way, including construction, heavy munitions, shells and shell filling, mechanical transport, tanks, guns, ships, aircraft and mining and have already completed over 7,000 audits to date.

Now, what are our duties and responsibilities? I can probably best tell you by running over the various types of contracts containing audit clauses.

We all know that the Canadian Government, and its procurement agency, the Department of Munitions and Supply, has made it clear to all contractors that there shall be no profiteering on war contracts and that the costs of production must be driven down to the lowest possible level by modern methods and strict economy. This principle follows through the prime contractor to sub-contractors of the smallest components.

Where possible, the Department prefers to place orders on a firm or fixed price basis resulting from competitive tenders. It is felt that this is the most reliable assurance that costs are controlled and profit margins held to reasonable limits. Canadian war contracts on a fixed price basis ordinarily do not contain any re-negotiation clauses and the price stands. However, in many cases the Department has no alternative but to resort to some form of a cost-plus contract and it is this type of contract in which we, as cost auditors, are primarily interested. No general set of rules can be laid down as to when a fixed price or some form of cost-plus contract will be used. Generally speaking, fixed prices are used when experience has shown that the price is right according to sound commercial purchasing practice or after accurate costs have been obtained on previous contracts on a cost-plus basis or, after costs, submitted by the contractor of a trial or target



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run, have been reviewed or scrutinized by our Division and the Department.

The most popular type of a cost-plus contract calling for audit is that known as the "ceiling" contract. These contracts set a ceiling on the price to be paid, which price is subject to cost audit and profit limitation. The ceilings are not established without some knowledge of the approximate cost of the product and usually represent a sound figure of probable cost, but make no provision for contingencies.

Straight cost-plus contracts, providing for a percentage of profit on cost, are avoided wherever possible, but where they are placed, there is always a provision for audit in the contract.

The cost-plus-fee contract is divided into two classes: First, cost plus a lump sum management fee and second, cost-plus a fee per article. The lump sum management fee is usually where a contractor is providing the management for a Government-owned pre-financed plant. Where the unit purchased is large, for example, a tank, the fee is usually so much per article. Of all cost-plus contracts the cost-plus fee are the most desirable.

There is another important type, known as the "target" contract, where the contractor is granted his costs of production, plus a profit. If his costs are less than the target, he gets his costs, plus the fixed fee and a percentage of his savings. If his costs exceed the target, then he gets his costs and his fee, or his profit is reduced. For example, suppose the target price is set at \$100.00 and the agreed fee per unit is \$5.00. If his costs are exactly \$100.00, he will get \$105.00 per unit. If his costs are \$80.00, he would get \$80.00, plus \$5.00, plus say, 25% of his savings, that is, \$5.00, so that in total he would get \$90.00 for the article. If his costs were \$110.00, he would get his costs, but his fee would be reduced to say, \$2.50, so that he would get \$112.50 for the article.

You will understand, of course, that there are several variations of each of these main types of contracts.

In those main types which I have described, it is the audit clause which gives us our authority to proceed and our work in establishing costs is carried out on either a continuous overall basis or dealing with the individual contract on a specific basis. That is, if a company is not wholly engaged on war production, our audit consists of an examination of the costs of the particular contract, whereas, if the contractor is wholly engaged on war production which obviously includes Government-owned or Government pre-financed projects, the audit is of a continuous nature on an overall basis. There is an exception, however, where the contractor, while wholly engaged on war production, is manufacturing a diversified number of articles on various types of contracts with different profit margins. In this case, we have no alternative but to consider each contract on an individual basis.

Up to this point, I have referred only to prime contracts, but the Government has wide powers in the case of every prime contract subject to audit, to re-open any sub-contract and to enforce recovery of any profit it regards as excessive. The general policy is that a sub-contractor shall have no better a deal than the prime contractor. The Government has not been called upon to enforce these powers to any great extent, as most sub-contractors fully recognize their responsibilities. Most of the larger prime

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contractors make use of the standard audit clauses in letting sub-contracts on one of the several cost-plus bases, and it is part of our duty to take on these audits on behalf of the prime contractor. Audits of sub-contracts, however, are of such volume, that it has been found necessary to use the facilities of public accounting firms, usually that of the sub-contractor, who report to the Government following our standard audit procedure.

There are several other types of assignments which we are given to do which I think should at least be mentioned, such as the audit of contracts to establish the cost of capital expenditure made by prime contractors, either out of their own funds for the account of His Majesty or out of funds advanced by His Majesty. This is what we know as a capital assistance contract, the asset so acquired being the property of His Majesty. Then there are the ship and aircraft repair agreements, which are assuming large proportions and require a considerable amount of work from the point of view of cost audit. We carry out, on behalf of the Rubber Controller, a continuous audit in connection with the consumption of rubber by all users. We also make numerous special investigations for various Government agencies and departments where the experience of our staff can be utilized.

Operating essentially as a fact finding organization, we report on our examination of the contractor's cost submission to the Department under whose administration the contract was issued. Our report is prepared in such a manner as will reflect the costs of the contract and, in addition, bring out any extraordinary costs not reflected in the terms of the contract. With these reports before them the negotiating officers of the Department are then able to finalize their settlements with the contractors.

It is no part of our function to fix prices or rates of allowed profit. We merely establish the cost in accordance with the terms of what is known as "M & S 433", the costing memorandum of the Department of Munitions and Supply, usually referred to and forming a part or condition of the majority of war contracts.

Before going on to discuss this costing memorandum, there is one further definite responsibility that we as treasury officers must assume in the course of our work, that of seeing that all expenditures from public funds are made in accordance with existing statutes and laws. We must, therefore, challenge and report thereon to the Comptroller of the Treasury, payment of any account which includes improper costs, even though admitted by the administrative department.

Now, back to M & S 433. It is an innocent looking document, but plays a prominent part in establishing costs on war contracts. It is a statement which sets out in some detail the fundamentals of cost control in Canadian War Contracts. It is a formula which outlines the general elements allowed as cost and lists in detail those items excluded as costs. It is a yardstick which was developed after studying the existing practice of the British, Canadian and United States Governments. I would like to review the contents of this memorandum in some detail.

You will understand that the memorandum could not hope to cover all conceivable elements of cost specifically and omission of mention is to be in no way restrictive upon the Government in determining the costs of a contract. If an item of cost is not specifically mentioned, that does not

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mean it is to be automatically excluded. If an item of cost is not listed under inadmissible costs or described as one subject to limitation, it does not therefore follow that such an item is acknowledged to be admissible.

It is well to keep in mind that the total cost in any Government war contract is the sum of all costs incurred by the contractor, incident to, and necessary for, the performance of the contract and properly chargeable thereto, and in accordance with M & S 433, they shall be the sum of:

- "(1) Direct materials.
- "(2) Direct labour.
- "(3) Director expenses.
- "(4) A proper proportion of applicable indirect costs (including a reasonable proportion of management expenses)."

It is obvious that in defining the general elements of cost in a standard form, it is expected that a certain elasticity will be permitted, particularly when it is used as the basis of costing widely diversified contracts. With this in mind, it was felt that the general elements of cost could at least be listed, and here they are as follows:

### "I. Manufacturing Costs.

- (a) Direct materials.
- (b) Productive labour.
- (c) Direct engineering labour.
- (d) Miscellaneous direct factory charges.
- (e) Indirect factory expenses.
- (f) Other manufacturing costs.

### II. Miscellaneous Direct Expenses."

### III. Miscellaneous Indirect Expenses."

The memorandum then goes on and states those items which shall not be included as cost. I think it might be well to read them to you at this point:

- ( 1) Allowances for interest on invested capital, bonds, debentures, bank or other loans.
- ( 2) Entertainment expenses.
- ( 3) Dues and other memberships other than regular trade associations.
- ( 4) Donations (other than normal contributions to local charities).
- ( 5) Losses on other contracts.
- ( 6) Losses from sale or exchange of capital assets.
- ( 7) Depreciation on buildings, machinery or equipment paid for by the Crown.
- ( 8) Fines and penalties.
- ( 9) Amortization of unrealized appreciation of values of assets.
- (10) Expenses, maintenance and/or depreciation of excess facilities.
- (11) Increase in reserves for contingencies, repairs, compensation insurance and guaranteed work.
- (12) Federal and Provincial income, excess profits or surtaxes.
- (13) Unreasonable compensation for officers and employees.
- (14) Bond discount or finance charges.
- (15) Premiums for life insurance on the lives of officers.
- (16) Legal and accounting fees in connection with reorganizations, security issues or capital stock issues.

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- (17) Losses on investments, bad debts and expenses of collection.
- (18) Advertising and selling expenses.

M & S 433 briefly describes some of the usual accounts included in the general elements of cost, but at the time at my disposal I can only hope to high-spot the more important items, dealing with the general accounting principles involved, rather than to recite the names and treatment of the various accounts referred to on the form.

It is important to remember that no attempt is made in the memorandum to prescribe the type of cost system to be used by any contractor. Any system of accounting and any method of cost accounting may be acceptable if they are in accordance with generally accepted and sound accounting practice. The method of calculating costs may be of any type preferred by the contractor and suitable for the conditions, so long as its provisions are such as to produce accurate figures and are consistent with the principles laid down in M & S 433. It is desirable, of course, that the cost system be controlled by the general accounts, as without suitable proof of control, the cost submissions might be seriously open to question. Standard costs are acceptable for cost determination under Government contracts, provided the variation accounts are restored properly, so that in the end, the costs chargeable to the contract will stand on the basis of actual costs.

Inventory methods governing the withdrawal from stock of raw materials, parts and supplies should be consistent with the inventory method customarily used by the contractor, provided such method is in accordance with sound accounting practice and is acceptable to the Income Tax Department.

The costing of direct materials should offer very few problems. Charges for material, however, should be net, after deducting all cash discounts, and, in addition, all cash discounts accruing to prime contractors on sub-contracts, and after deducting trade discounts, rebates and allowances received or receivable by the contractor. It is important that material cost should receive full credit for any excess materials retained or returned to vendors by the contractor and sub-contractors. Scrap should be taken into account at current scrap prices whether or not the scrap is sold.

In dealing with direct labour, it is important that special premiums, bonuses and overtime payments, if treated as direct labour costs, should be separately stated and under no condition should they be included in the base if the overhead is distributed on the basis of direct labour. By segregating the special items of direct labour, we eliminate the possibility of an inequitable distribution of overhead as between war contracts and commercial business where the contractor is in production on both.

As we all know, complete uniformity does not exist in the definition of direct labour, even within single industries. In contracts including escalator clauses which provide for adjustments in accordance with changes in labour rates, particular care should be taken to have a clear understanding in advance as to what items of labour shall be subject to such adjustments.

The next general element of cost referred to on M & S 433 is that of direct engineering labour. The type of engineering service meant here is that which is related immediately to manufacturing operations as distinct from research and development expenses which the contractor may be devot-

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ing to future improvement of new products or even of products being currently produced. The expense of maintaining testing laboratories should not be included as a part of direct engineering and would seem to belong more properly as an indirect factory cost as one of the many service departments. Direct engineering labour should, then, consist of compensation of professional engineers and other technicians, together with draftsmen.

Included in miscellaneous direct factory charges would appear manufacturing royalties or license fees or any other items which do not come within the scope of direct materials, direct labour or direct engineering labour, but which can be definitely associated with specific operations or products as direct factory charges.

There are those circumstances, in the accelerated production of goods under a war program, which may call for special re-arrangement of plant facilities and the amortization of other special facilities at a rate greater than normal. It is essential that these special costs and expenses be set out separately from the normal, and because they are directly attributable to production under Government contracts, should well be included under direct factory charges.

We now come to the indirect factory charges, that is, factory overhead or burden and here is where probably most of our problems arise, and yet if we treat each of the items on an individual basis according to its merits and use a common sense and fair approach, the results should be equitable from both the Government point of view and that of the contractor. Most of the difficulty, of course, arises when a contractor is working concurrently on both Government and private work. Usually recognized accounting practices, which fundamentally demand uniformity of treatment in connection with the application of indirect costs should tend to produce fair and reasonable costs.

There are so many different treatments accorded the distribution and allocation of indirect costs that it is not possible for me to refer to them in other than a general way. To get specific and do justice to the subject would require many hours and we would even then fall short of covering it adequately. You are all acquainted with the items making up indirect factory expenses, that is, labour, materials and supplies and the service expenses, the fixed charges and miscellaneous items and familiar with many methods of allocation. We all have our favourite plan which we have grown up with, probably in our own business or at least have had the opportunity of seeing it successfully operated in the course of our work. They all have their merits and because of that fact, the appropriateness of any particular method insofar as the Government is concerned, must remain subject to the exercise of judgment in the costing of the contract. The main rule to follow is that the Government contract should include only an equitable allotment of any costs which relate jointly to other activities of the business.

If the contractor's business has not changed basically in the shift to war production, we must presume that normal methods, provided they have been consistently tested by operation in the past, are satisfactory. However, this is only a presumption. If the business has changed radically with the taking on of war work, the former methods of distribution may be entirely

## COST AND MANAGEMENT

inadequate and therefore must be reviewed in some detail to determine whether or not they are in fact reasonable and equitable.

Before concluding, I would like to leave a few further thoughts with you.

I think everyone recognizes that the cost accountant is playing a very important role in this war, and management is looking to him more and more for help and guidance.

The cost accountant, for his part, must keep abreast of modern methods and trends, always keeping foremost in his thoughts the essential use for which the costs are being prepared. If engaged in war production, price fixing may be the most important, but management's responsibility and the Government's interest in determining the efficiency of the operation should not be overlooked. Perhaps the cost should be \$50.00 per unit, rather than \$60.00 per unit as shown by the records. If cost reports are to be of more value to management in this regard, they must be complete, but prepared in a clear and concise manner without too much "foliage."

We mustn't let ourselves get the "super distribution phobia." You have probably all heard of the cost accountant who always knew the cost of painting the president's office, but found it difficult to come up with the cost of the product his company was producing.

Costs can be streamlined just as well as production. Let us think of a large gun, tank or aircraft with thousands of parts produced in the contractor's plant and purchased from outside vendors. If we had time, we might like to take the smallest component and start it out of raw material stores, cost it in and out of process, in and out of finished parts stores to sub-sub-assemblies, to sub-assemblies, to major assemblies. Eventually the cost of the item would find its way to finished goods inventory as a part of the gun or tank. All very fine from a control point of view, but perhaps control in this instance is secondary to the quick determination of the cost of the finished article. In all probability, unit control would be sufficient and our material costing could have been reduced to one jump from raw materials to the finished product by means of a bill of material. With the limited staffs available, wartime costing must take the short cuts.

The necessity of keeping on top of the job is also of prime importance. We should avoid, if at all possible, letting charges pile up in the process accounts by failure to make prompt clearances. I think it is better to get out a cost quickly and, where necessity indicates, refine it as you go along. The cost accountant knows that profit margins are small in Government contracts and that the cushions of pre-war days are not available. He may feel, therefore, that by proceeding cautiously and slowly, errors and the accompanying criticism will be avoided. The principle is sound but the result, unfortunately, is not always what he expects. Machines producing war goods are moving at a rapid pace and before long he finds finished goods are moving out the door many months before clearances have been made even from the process accounts. Machines cannot stop while the cost accountant ponders over a decision. New production is on the way through in a never ending circle and the confusion and dangers of costing "pile-ups" can more than off-set the apparent advantage of his having proceeded

## FOUNDRY COSTING

cautiously and slowly and, what is more, management is deprived of an essential tool.

Everyone in wartime is called upon to make prompt decisions and the cost accountant is no exception.

### Foundry Costing

BY J. E. CARRUTHERS

Chief Cost Accountant, Ford Motor Company of Canada Limited

(Any figures used are inserted merely to illustrate and are not actual amounts).

#### Furnace Metal Material Costs.

1. To arrive at material costs in a Foundry it is essential that accurate reports are arranged for to show the quantities of the various classes of materials used in the furnaces and the production, both gross and net, of each part produced.

#### Foundry Materials.

2. To determine the quantity of each class of metal used, the Foundry Superintendent, assisted by his technical staff, compile a standard "charge" per furnace which is designed to produce metal of the desired analysis. These standard charges are used as a guide when loading a "charge"—into the furnace loading bucket. This bucket is placed on scales and the magnetic crane loads the bucket. The actual weight of each type of metal is registered and entered on a Furnace "Charge Report" (Exhibit A). These "Charge" reports are collected daily and summarized on Furnace Report (Exhibit B) to show the quantity of each type of metal used for all heats and a final total of all ingredients used. The furnace report shows the gross number of each part produced and the gross weight per piece—also the number and weight of pigs made. A calculation is made and the total weight obtained is balanced against the total weight of metal melted in the furnace. The difference represents lost weight through evaporation, materials used for purifying the metal, spills and pigs poured. Any major differences are run down by the foundry before releasing these reports to the Cost Department.
3. It will be observed that there are two types of furnace reports used—Exhibit A is the weight sheet taken as the "Charge Buckets" are loaded, while Exhibit B represents the additions to the melt made to adjust the melt to the proper analysis. On this later report is posted the Gross Weight per piece poured and the volume of each part, also the pigs made.
4. Having regard to the fact that all metal poured can ultimately be used in producing good castings, the only loss in metal value is the evaporation that takes place while melting and the loss of the ingredients used to purify the metal (i.e.) Limestone, Aluminum and Petro Coke, etc.
5. When examination is made of the materials used in the furnace melts it is noticed that a certain amount of new materials have been used

## COST AND MANAGEMENT

and a certain amount of "remelt" metal has been put back in the mixture. The new materials used have a cost value, while the re-used materials can be considered as having no value for the purpose of distributing costs.

6. The statement that "Remelt" metals have "no value" can be challenged on the grounds of the previous statement made to the effect—that the only loss in value is the evaporating and the purifying ingredients. However, it should be kept in mind that the only value to be distributed is the amount lying in process manufacturing accounts not previously distributed and if the remelt is given a value it will be necessary to charge manufacturing operations with this value and credit a "Sale of Scrap" account. This would create a high profit position in the "Sale of Scrap" account and consideration of this would have to be given in the nature of a reduction in costs on individual parts on a pro-rata basis. Instead of costing in this manner a cost is developed by taking the Gross volume of parts produced at net weight and ascertaining the cost per pound of metal. This is accomplished by dividing the Cost of the new materials used in the furnace mix by the Gross Volume times the net weight. The net weight of a part multiplied by the Cost per pound will indicate the material cost of that part.
7. At this stage a calculation of the Gross Volume of parts by the cost per pound will produce an accurate distribution of cost of new materials used. However, the problem remains of determining the cost of the good castings produced.
8. After pouring, the parts produced are snagged, cleaned and ground, inspected, annealed, etc. During this process a considerable number of castings are damaged, while the defective parts are rejected by inspectors. A daily report is completed of the number of good castings produced. These figures are applied to the Gross Casting poured and a percentage of spoilage to net good castings is compiled. Some castings have a higher spoilage than others.
9. In order to recognize this spoilage factor, which varies with each part, reference is now made to the distribution of material costs by part number, which accounts for all moneys spent. The total cost for each part ( $\text{Gross Volume} \times \text{Cleaned Weight} \times \text{Cost Per Pound on Metal}$ ) is divided by the net volume of good castings produced. The result is a unit material cost per good casting at net weight.
10. The same results are obtained by:—
  - (a) Multiply net weight of casting by Cost per pound.
  - (b) Increase by adding % of spoilage to Cost as developed above.
11. A schedule Exhibit C is attached which shows an actual calculation compiled for a cost period indicating how the costs are computed in both ways as outlined above to get the same answers. Section A of the attached schedule illustrates paragraph number 9 and Section B covers paragraph number 10.
12. It has been argued that as all metal poured can ultimately be used to produce good castings that spoilage should not be added to the value as indicated in paragraph 10b above. However, when considering all factors it was decided that this method was the only correct solution to



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the problem. Consider the fact that there is \$94,827.30 to be distributed among the castings produced and we arrive at the conclusion that this distribution of value is on the basis of its use. When this has been determined it follows that the net good castings must bear the cost of the metal poured.

### Labor Costs—Melting.

1. The Labor Costs for melting can be arrived at in several ways. There is the Labor incentive method which guarantees a base rate but pays on tonnage produced. The rates for tonnage produced should enable melters to not only earn their base rate, but exceed it.
2. The payment of straight day work makes the problem a little more difficult. It is necessary to study the number of men necessary to operate a furnace and the average number of heats that each furnace turns out. After studying all factors a standard hour is developed to represent the unit of time taken to melt a given quantity of metal. This standard is based on the pounds poured into moulds. The wastage through evaporation, purifying compounds and pigs poured are disregarded. Only metal actually poured is considered.
3. The labor cost at this point is called "Labor Costs at the Spout". It does not include the labor for pouring—as each casting poured is different—therefore different labor standards are required for each part.
4. Reference to Foundry Furnace Report "Exhibit B" will show how the metal poured compares with the actual metal melted.
5. The efficiency of the operation when applied to standard hours per pound of metal poured is arrived at in the following manner:
  - (a) Record on daily production report (summarized every two weeks to tie in with the pay period) the number of castings poured as taken from the foundry Furnace Report (Exhibit B).
  - (b) Standard Hours for each casting is arrived at by multiplying the Gross Weight Poured by the standard hours per period as developed through process outlined in paragraph 2.
  - (c) Accumulate the total standard hours for all parts produced. Compare with actual hours paid for these operations. The ratio between actual and standard is then determined.
  - (d) If the ratio is 110 and the actual labor rate is 90c per hour then the Cost per standard hour is 99c.
  - (e) Application of the Cost per standard hour to the standard hours set for each part (see para. 5b) will furnish the labor cost per casting at the spout.
6. Paragraph 5 deals with the cost of the castings ready for pouring at the spout. Between the time the Castings are poured to the time they leave the foundry—there is a loss. This can be seen by referring to "Exhibit C". Some castings have a greater spoilage than others. When castings are spoilt all the labor and overhead performed on them up to the point of spoilage has been lost. So that each part will bear the cost of its own spoilage the percentage of castings spoilt to net good castings shipped is added to the cost of the labor at the spout. Attached is a foundry cost sheet, "Exhibit D", which reflects this calculation.

## COST AND MANAGEMENT

### Labor—Pouring and Shake Out.

After the metal is melted it is poured into the various moulds—Dry Sand—Green Sand and Permanent Moulds (Metal).

The first operation to consider is pouring. A standard hour is set for each part. As each part differs in size and weight—some spun and some poured in stationary moulds—it becomes necessary to study all these conditions before arriving at a standard. The standard hours are then established based on Gross Castings poured. The production during the pay period is developed and the Total Standard Hours are calculated. When applied against the actual hours worked the variation from standard is determined and the cost per standard hour developed in the same manner as outlined for Melting Labor Costs.

The loss between pouring and finishing is calculated and the percentage of loss added back to the Gross Cost. This means that every part carries the cost of its own spoilage. The percentage of spoilage is calculated on the net good castings to pieces spoilt.

The labor standard for "shake out" is calculated separately, but for the sake of convenience of calculation is combined with the labor of pouring.

### Labor—Cleaning—Heat Treat.

The labor standards for this class of work are developed along different lines than the Melting, Pouring and Shake Out Labor. It is a simple matter to determine the spoilage for the latter as the difference between poured and finished represents the spoilage. To determine the spoilage at each operation required to finish the casting after it has been shaken out of the moulds would require a considerable clerical staff. To overcome this the time study men establish, after study, what they consider as a fair loss at each operation for each type of casting and make allowances in the standard hours set to pick up such losses. The theory being that if the standard hours are correctly established and the loss due to spoilage considered at a fair figure then the inefficiency of the operations will be picked up in the variation from standard and reflected in the cost per standard hour.

Unlike the other labor operations the cost of the spoilage has been picked up in the labor costs, therefore it will not be necessary to add anything to this labor cost for spoilage except for one factor—which is the loss due to defective castings discovered after the casting has left the Foundry. The defective castings returned are recorded and the percentage based on net good castings produced. This percentage of spoilage is added back to all the labor performed in the foundry whether for Melting, Pouring or Cleaning, etc.

## CORES AND MOULDS

### Material Casts.

1. We will deal with the cores and moulds which are currently being used.
  - (a) Green Sand.
  - (b) Dry Sand.
  - (c) Permanent Moulds.

### Green Sand.

2. The materials used to make Green Sand moulds can be used again after the casting has been shaken out. At that time the used moulding sand

## FOUNDRY COSTING

is sifted to remove all "fins" and foreign matters before being sent back to the mixed where new ingredients are added preparatory for its re-use.

3. The operations for making Green Sand moulds are kept separate from Dry Sand operations, therefore, separate locations are allotted for each type.
4. All ingredients used are brought together in a mixer. After being thoroughly mixed the prepared sands go to a hopper ready for use.
5. At this time it becomes necessary to arrange to secure daily reports of the new materials added. These materials are summarized and costed each cost period. It is very necessary that accurate reports are made as the correctness of the costs depends upon them. To make sure of this a test check is prepared. Take an inventory of all materials to be used at the beginning of the period, add the purchases made during the cost period and then deduct the inventory taken at the end of the period. Match the results obtained in this method against reports made of materials used.
6. The test check through inventories and purchases is at the best a rough and ready check, as all foundry materials have to be considered—both Green Sand and Dry Sand. A consolidated result only is obtainable but nevertheless inaccuracies of reporting become apparent.
7. When a foundry first starts up all materials used are new—they are absorbed in the first costs. Similarly when foundry production increases new additional materials are used. These are included in the costs of the new materials added to the mix. New production of castings readily absorb the increased costs.
8. To distribute the Cost of the new materials used, it is necessary to determine the total weight of all cores and moulds consumed during the cost period.
9. To arrive at this figure the unit weight of the cores and moulds required for each type of casting poured in Green Sand is ascertained. Multiply this figure by the total number of Casting poured.
10. The total amount of money spent for new materials is divided by the total weight of the cores and moulds. The resulting cost per pound is then multiplied by the weight of the moulds used to make each type of Casting. The answer represents the cost per mould for each and every casting poured.
11. The moulding costs are then transferred to the Foundry Cost Sheet—See Exhibit D.
12. Whenever a casting is spoilt the core and the moulds are lost. It is necessary to pick up the cost of the loss for each part and add it back to the original cost. This is accomplished by determining the spoilage of castings. The percentage of spoilt castings to net good castings produced is ascertained and added back to the cost. The result of this is to make each casting bear the cost of its own spoilage.

[Editor's Note.—Unfortunately it was impossible to reproduce Exhibit D].  
**Dry Sand Cores and Moulds.**

13. The difference between the costs of green and dry sand moulds is caused by the fact that the materials used to make dry sand moulds cannot be

## COST AND MANAGEMENT

used over again. The labor costs for making them are higher and each dry sand mould and core has to be baked in an oven. It is obvious that dry sand moulds and cores are more costly than Green Sand.

14. It might be asked, why—if this is so—should Dry Sand moulds be used? There are many reasons, but as Cost is the subject now under discussion no attempt will be made to answer this fully. However, spinning metal is done in Dry Sand moulds. The use of Green Sand moulds for this type of foundry production has not been successfully accomplished yet.
15. To arrive at the Cost of Dry Sand moulds and cores, the same procedure is used as for Green Sand. The only difference being that the reports for the materials used must be complete so as to include all items used, all of which are costed and applied to the total weight of "Dry Sand" used to produce all castings made by the "Dry Sand" method.
16. To arrive at all factors to determine the weight and the number of cores and moulds used for each type of casting produced—a data sheet is prepared for each part by the Foundry and Time Study—which when complete is sent in to the Cost Department for figuring. (See Exhibit E).
17. The reports of the materials used to make the various cores and moulds are sent in on a report form which is attached and shown as Exhibit F).

### Permanent Moulds.

18. As the name would imply these moulds are made of metal and are used over and over again. Their life is limited and study of results is the only means of determining how many castings can be made from one mould.
19. The cost of the mould is first ascertained and recorded against the part to be produced. A number of these moulds are made for each part and replacements are being made continuously. An estimate is prepared by the Foundry Superintendent of the number of Castings expected to be produced from each mould. This is used at first as an estimate when preparing costs. The record that is maintained for each part shows the cost of all moulds bought. The volume of parts produced and the amount of the mould that has been absorbed to date at the unit cost estimated. Eventually the record reveals a uniform cost pattern and the estimate at first given is replaced by actual cost performance.

### Labor—Cores and Moulds.

1. Labor standards are prepared by the Time Study for each core and mould produced—whether for the Green or Dry Sand. The summary of such standards are posted to the production report. As the making of the Cores and Moulds synchronizes with the pouring of the castings, the production of the cores and moulds is taken to be the same as the Castings poured. The total number of actual hours is compared with the standards established and the difference represents the variation from Standard. The ratio is applied to the actual rate per hour and a labour cost per standard hour is developed. This rate applied to the

## FOUNDRY COSTING

standard hours set for each part will furnish an actual labor cost per cores and moulds used per casting.

2. The spoilage costs are added and are computed on the same basis as for materials and which is outlined in paragraph 12 of Green Sand Moulding Material Costs.

[Editor's Note.—Unfortunately it was impossible to reproduce Exhibit G].

## MISCELLANEOUS

### Electrodes.

1. It will be noticed that on the Foundry Cost sheet provision is made to costs "Electrodes" as a separate element of Cost. This is a large item of cost in the electric furnaces and is kept out of the overhead. A record is maintained of all electrodes used during a cost period and the cost per pound of castings poured is calculated. From this the Electrode Cost per casting is ascertained.

### Fuel Coal.

2. Melting furnaces which use coal instead of electricity are kept separately. The coal used is taken from reports sent in by the foundry and costed. The pounds of castings poured from "coal furnaces" is determined and the cost per pound of casting is calculated and transferred to the foundry cost sheet.

### Heat Treat.

3. Castings requiring Heat Treat as through the Heat Treating departments and costs are obtained by use of the Standard hours set by the Time Study Department. The spoilage for this operation is very small, being occasioned mainly through defective castings made and discovered after the castings have left the Foundry. The percentage of such loss is added back to the Heat Treat Costs so as to maintain the principal of having each part bear the costs of its own obsolescence.

### Spoilage.

4. Emphasis has been made throughout on the method used to charge back each part with the cost of the parts spoilt rather than handle through overhead. If overhead is the result of a percentage to productive labor then to charge all spoilage to overhead would result in a weighted average cost of spoilage dependent on the productive labor for cost application. The effect would be for castings having a high spoilage rate to be undercasted and the castings with a low spoilage burdened with unearned costs.
5. A great deal of consideration was given as to how to handle spoilage and it was considered that the method outlined so far, results in fair and accurate costs.
6. The greatest difficulty is to secure accurate spoilage reports. It has been observed that no matter how good the shop is in reporting losses—the reports are subject to errors, due to the very nature of foundry operations. To get accurate answers arrange to get accurate counts of:
  - (a) The total castings poured by part number.
  - (b) The total castings finished part number.
7. Disregard the work in process if the volume of work is constant. The difference between the total castings poured and finished will furnish

## COST AND MANAGEMENT

the number of castings spoiled. If the production varies continuously then arrange to take inventory of all castings in process at each cost period and adjust the spoilage by the difference between the inventory at the beginning and the end of the period.

### Metal Scrap.

8. When a foundry is a department in a manufacturing plant which machines castings it is necessary to maintain the foundry as a separate business. To do this all the metal scrap turned over by the machining division is recorded and charged to the foundry costs at the fair market value. This will create a revenue for sale of scrap. The scrap has to be disposed of, either you sell it to metal dealers or you sell it to yourself. The effect of this is to create a true foundry cost which is competitive. Any defective foundry parts reported by the machine shop are returned to the foundry and treated along with the foundry spoilage and included in the cost of the casting. All machining time lost is charged to the Foundry.

### Overhead.

1. Examine the plant and decide what costs are wanted and then break down the foundry operations into departments.
  - (a) Electric Furnace.
  - (b) Brackelsberg Furnace (Coal).
  - (c) Core and Mould Making.
  - (d) Pouring and Cleaning.
2. The above represent the usual departments in a foundry.
3. If sales are to be made of "pig"—then it is necessary to know the cost of the metal at the spout.
4. If sales are to be made of cores and moulds, then it is necessary to know the overhead cost of this department.
5. If sales are to be made of finished foundry castings then the overhead of the Pouring and Cleaning departments are required.
6. As core and moulds are made to flow along with the production of poured castings and as core and moulds are not sold as such, why then establish two burden centers when one will do?
7. If we decide to have three burden centers, namely—
  - (a) Electric Furnace.
  - (b) Coal Furnace.
  - (c) All other foundry operation.then it is necessary to have all information collected into these three groups.
8. Overhead is applied to productive labor for determination of a burden rate.
9. Arrange to classify overhead into two main groups—
  - (a) Variable Expense.
  - (b) Non-Variable Expense.
10. Charge all operating expenses to variable Expense. These expenses rise and fall in direct ratio to the productive effort. In other words, the expenses vary with varying volumes.
11. The fixed charges can be considered as belonging to that group of expenses that usually do not vary with volume of production. These

## FOUNDRY COSTING

expenses can be broken down into two more divisions—"fixed charges" and non-variable.

12. "Fixed Charges" include such items as—
  - (a) Depreciation.
  - (b) Taxes.
  - (c) Insurance.
  - (d) Rents.
13. Non-Variable Expenses are a little more difficult to define. They are those type of expenses that are not affected by the rise and fall of production within normal limits. The biggest items of this type of expense are all salaried personnel—such as supervisors and clerical, watchmen, doormen, elevator operators, subscriptions, etc.
14. It is desirable as far as practical to break down the manufacturing expenses into these groups as it helps to forecast burden at varying volumes and is also useful when fixing selling prices.
15. Depreciation is divided between buildings and equipment. The equipment is listed where it is located and the depreciation is charged to the required department. Building depreciation is pro-rated according to floor space. Taxes on buildings to be pro-rated on basis of floor space—while property taxes can be split either on the basis of the floor space occupied by the buildings or pro-rating on the basis of productive effort of the manufacturing plant. The former method seems to be the most desirable. Insurance to be distributed according to what is insured. Rents to be treated in the same manner as depreciation and taxes on buildings.
16. To determine selling prices the overhead of any one month should not be taken. A 12 months' average is reasonably satisfactory, but cannot be used without examining past performance and injecting a forecast for the future. It may be said that the only proper basis is to calculate a standard overhead rate based on normal production. The standards to be changed from time to time as conditions warrant.

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## EXAMINATIONS

The Society of Industrial and Cost Accountants of Ontario will conduct examinations leading to the degree of R.I.A. as follows:

Fundamentals of Cost Accounting	- - -	Monday, May 17th
Advanced Cost Accounting	- - - -	Wednesday, May 19th
Industrial Organization and Management	- -	Friday, May 21st
Bookkeeping	- - - - -	Tuesday, May 25th
Accounting	- - - - -	Thursday, May 27th

## COST AND MANAGEMENT

[illegible]



# FOUNDRY COSTING

Scrap—Rails Scrap Malleable Scrap—Auto Cast Scrap—Shell Ends Remelt Remelt—Push Rod Remelt—Army Nickel Flashings Briquettes	18 19 20 21 22 23 24 25 26 27 28	each Furnace No.	Part Number	Poured Weight	NUMBER OF PIECES PRODUCED PER HEAT	This is a record of the actual number of castings poured which, when multiplied by the poured weight per casting will give the total pound weight. A comparison between melted weights and poured weights is obtained.
Total Charged Limestone Aluminum Petro Coke						
Items 1 to 21. These are accumulated from the Daily reports.				Unit weight which has been established after careful study.		
Power On Sample Tapped All Out Heat No. per Lining Transferred from Heat No.				M.		

EXHIBIT "C"  
SECTION "A"

Item Number	1	2	3	4	5	6	March, 1943.	
							7	7
	Total No. of Castgs Poured	Total No. of Good Castings	% Spoilage Spoiled Castgs to Number of Good Castgs	Total No. of Pounds Net Weight of Cleaned Castings	at Cleaned (1 x 4)	Distrib. of Money Spent (5x1½c per lb.)	Avg. Cost per Piece of Good Castings (6 ÷ 2)	
1	1,848	1,751	5.54	18.20	33,634	504.51	28.81	
2	7,080	6,939	2.03	36.	254,880	3,823.20	55.10	
3	23,160	19,840	16.73	33.50	775,860	11,637.90	58.66	
4	3,651	3,491	4.58	9.25	33,772	506.58	14.51	
5	2,023	1,690	19.70	24.50	49,564	743.46	43.99	
6	23,585	22,653	4.11	25.75	607,314	9,109.71	40.21	
7	4,571	4,352	5.01	25.	114,275	1,714.12	39.38	
8	50,018	48,865	2.36	53.	2,650,952	39,764.28	81.38	
9	752	748	.53	27.25	20,492	307.38	41.09	
10	5,260	4,680	12.39	12.50	65,750	986.25	21.07	
11	12,404	10,548	17.60	13.25	164,353	2,465.30	23.37	
12	6,257	4,902	27.65	27.	168,939	2,534.09	51.70	
13	5,885	4,610	27.65	27.	158,895	2,383.42	51.70	
14	3,030	1,921	57.75	45.50	137,865	2,067.97	107.65	
15	5,389	3,416	57.75	45.50	245,200	3,678.00	107.66	
16	26,328	23,276	13.11	8.50	223,788	3,356.82	14.42	
17	888	854	3.98	8.50	7,548	113.22	13.26	
18	1,590	1,556	2.19	7.75	12,323	184.85	11.88	
19	57,464	53,820	6.77	5.75	330,418	4,956.27	9.21	
20	84,354	78,036	8.10	3.	253,062	3,795.93	4.86	
21	4,312	3,754	14.86	3.	12,936	194.04	5.17	
TOTAL	329,849	301,703	48.146		6,321,820	94,827.30		

# FOUNDRY COSTING

## EXHIBIT "C"

### SECTION "B"

8	9	10
Ave. Cost per Piece of Gross Castings ( $6 \div 1$ )	Spoilage ( $3 \times 8$ )	Ave. Cost per Piece of Good Castings (Same as Item 7) ( $8 \div 9$ )
27.30	1.51	28.81
54.00	1.10	55.10
50.25	8.41	58.66
13.87	.64	14.51
36.75	7.24	43.99
38.63	1.58	40.21
37.50	1.88	39.38
79.50	1.88	81.38
40.87	.22	41.09
18.75	2.32	21.07
19.87	3.50	23.37
40.50	11.20	51.70
40.50	11.20	51.70
68.24	39.41	107.65
68.25	39.41	107.66
12.75	1.67	14.42
12.75	.51	13.26
11.63	.25	11.88
8.63	.58	9.21
4.50	.36	4.86
4.50	.67	5.17

# EXHIBIT "C"

Furnace Report = Metal Bought .....  
 " Salvaged .....

Castings Poured at Gross Weight .....  
 Less Sprue .....  
 Castings Poured at Net Weight .....  
 Metal Cost—(New Money Spent) .....  
 Average Cost per Pound .....  
 Castings Damaged in Process .....  
 Net Good Castings Produced .....  
 Average Percentage Lost .....

# COST AND MANAGEMENT

March, 1943. Page 2.  
 \$ 94,827.30  
 N/C  
 \$ 94,827.30

(See page 1 Column 5)

5,576,999 Lbs.  
 3,293,430 Lbs.  
 8,870,429 Lbs.  
 8,836,274 Lbs.  
 2,516,454 Lbs.  
 6,516,454 Lbs.  
 \$ 94,827.30  
 1.50c  
 529,526 Lbs.  
 5,792,294 Lbs.  
 9.14%

## EXHIBIT "E"

GE-238

## MOULDING DATA

\*Information to be supplied by Foundry relative to new parts, experimental parts and current parts when moulding method changes.

\*DATE — / — /4

## \*TYPE OF METAL

No. 4

No. 7

Cast Iron

## \*MELTED BY ELEC. FURNACE

A  
B  
CCams shaft  
Crank shaft  
Push RodG  
H  
I

## BRACELSBURG

## \*TYPE OF MOULDING

\*Green Sand

\*Dry Sand Spinning

\*Die

## \*CASTINGS PER CLUSTER

## \*POURED WEIGHT PER MOULD

## \*CLEANED WEIGHT PER CASTING

No. 1

Turn Table Speed

\*Type of Holder

No. 2

D  
E  
F

## \*CASTINGS PER MOULD

## POURED WEIGHT PER CASTING

Cope  
or  
TopDrag  
or  
Btm.

Riser

Splash

Gate Pin

Center

Pour'g  
Cup  
or  
Basin

Strainer

Slab

Special

## CORE DATA

\*Cores per Flask or Holder

\*Weight per Core

Cores per Casting

Produced: Turn table

Osborn

Rollover

Hand

Silica Spray or Dip

Graphite Dip

Cores per Box

Cores per Drier

Cores per Oven Plate

\*TYPE OF SAND MIX

REMARKS:

\*PART NAME

\*CHECKED BY

\*PART NUMBER

# COST AND MANAGEMENT

## EXHIBIT "F"

DU. 111

DATE:

### CORE AND MOULD MATERIAL

"M" NO.	Material	Crank Sand	Small Core Sand	Army Wash	Hub Moulds	C. I. Moulds
6067	Sharp Sand					
6066	Bank Sand					
6071	Silica Flour					
	Rex Flour					
8106	Cereal Binder					
8107	Clay Flour					
1401	Linseed Oil					
8108	Rosin Oil					
8110	Glutrin					
8112	Bentonite					
8109	Jumbo					
8111	Seacoal					
8085	Linoil					

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# HELPFUL INFORMATION

## at the end of your wire

In each local Burroughs office there is a reference library which contains detailed information on machine methods and procedures for all types of accounting work.

This information is constantly being added to as new methods — or even temporary wartime expedients — are installed or observed in action.

If you are contemplating a change in an accounting routine or procedure, we invite you to make use of the information we have available. Your request will receive prompt attention.

**Burroughs Adding Machine of Canada, Ltd., Windsor, Ont.**

# Burroughs

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